The sentences in terms of weeks have their maxima at 2, 5, and 9, for reasons which I do not as yet understand sufficiently to write about.

The general result is that if the judges were to act on uniform rules, the curve of distribution of terms of sentence would be mainly dependent on two sets of causes only, and would become much smoother in consequence. These are: (1) The distribution of true penal deserts; (2) errors of estimation, which would be distributed about each point in the true curve, according to the ordinary law of frequency of error, and with a modulus that might perhaps be determined.

It would be interesting to tabulate the sentences passed by the several judges since their appointments, to discover their respective peculiarities and personal equations, all who exercise extensive jurisdiction in criminal cases being included under the title of judge. We test the acquirements of youths by repeated examinations, but do not as yet employ the methods of statistics to test the performances of professional men. Examiners, for example, should themselves be tested in this way, and I have a fancy that a discussion of the clinical reports at the various large hospitals might enable a cautious statistician to express with some accuracy the curative capacities of different medical men, in numerical terms. Before putting oneself into the hands of any new professional adviser, it would certainly be a grateful help to know the indexes of capacity of those among whom the choice lay, not merely such as might be inferred from their performances in school and undergraduate days, or by their unchecked professional repute, but as they really are in their mature and practical life.

I will conclude by moralising on the large effects upon the durance of a prisoner, that flow from such irrelevant influences as the associations connected with decimal or duodecimal habits and the unconscious favour or disfavour felt for particular numbers. These trifles have been now shown on fairly trustworthy evidence to determine the choice of such widely different sentences as imprisonment for 3 or 5 years, of 5 or 7, and of 7 or 10, for crimes whose penal deserts would otherwise be rated at 4, 6, and 8 or 9 years respectively.

FRANCIS GALTON.

PROFESSOR FRANZ NEUMANN.

As already announced (p. 133) Prof. Neumann, the eminent physicist and mathematician, died on May 23 at Königsberg at the age of ninety-seven. At a recent meeting of the Paris Academy, the Secretary, M. Bertrand, in announcing the loss the Academy had sustained by the death of such a distinguished Correspondent in the Geometry Section, pronounced the following short *éloge* on Prof. Neumann's contributions to knowledge:—

"Franz Neumann, Professor of Physics and Mineralogy at the University of Königsberg, made his *début* in science more than seventy years ago, by some beautiful works on mineralogy. Soon after he directed his studies towards physics, and by an admirable 'Mémoire sur la Théorie des Ondulations,' which was presented to the Berlin Academy in 1835, he took his place among the masters of science. Neumann, like Cauchy, but by very different means, was led to consider luminous vibrations as taking place in the plane of polarisation, while Fresnel thought them perpendicular; he knew how to follow in the most minute details, always in accordance with the observation, the mathematical consequences of his hypothesis. But Fresnel's theory is not contradicted by any of the experiments, so doubt continues, and the ever renewed discussions, whatever their conclusion may be, will remain a noble homage to the man of science and profound physicist who was the first to start them.

"Neumann's memoir on induction showed again the great mathematical skill of its author. In it Neumann translated, by general formulæ, the discoveries of Faraday and Lenz's laws; it is to him that we owe the expression of the potential of a system of two closed currents, of which merely the existence, independently of the very elegant form which he has given it, has played such a great part in science.

"Franz Neumann was a great Professor. Even at the age of ninety he attracted numerous auditors; his lessons, received and written out by learned students, have been studied in all the universities of Europe. The study of physics was his aim; but when he came across a fine mathematical problem, he excelled in interesting his auditors by initiating them occasionally into the highest theories of analysis. It is with justice that in 1863 the Section of Geometry, making amends for a long neglect, elected this illustrious physicist into the Academy."

NOTES.

The annual meeting of the Royal Society for the election of Fellows was held on Thursday last, when the following gentlemen were elected into the Society:—Mr. J. Wolfe Barry, C.B., Prof. A. G. Bourne, Mr. G. H. Bryan, Mr. John Eliot, Prof. J. R. Green, Mr. E. H. Griffiths, Mr. C. T. Heycock, Prof. S. J. Hickson, Major H. C. L. Holden, Dr. Frank McClean, Prof. William MacEwen, Dr. Sidney Martin, Prof. G. M. Minchin, Mr. W. H. Power Prof. T. Purdie.

Mr. C. C. Harrison has presented a sum of £100,000 to the University of Pennsylvania, in memory of his father, Dr. George Lieb Harrison. The fund is to be known as the "George L. Harrison Foundation for the Encouragement of Liberal Studies and the Advancement of Knowledge." Only the income from the fund can ever be used, and it must be devoted to the establishment of scholarships and fellowships intended solely for men of exceptional ability; to increasing the library of the University, particularly by the acquisition of works of permanent use and of lasting reference to and by the scholar; to the temporary relief from routine work of professors of ability in order that they may devote themselves to some special work; or to securing men of distinction to lecture and for a term to reside at the University.

Science gives the following as the preliminary arrangements for the forty-fourth meeting of the American Association for the Advancement of Science, to be held in Springfield, Mass., from August 28 to September 7, 1895:—At the first general session the President-elect, Prof. E. W. Morley, will be introduced by the retiring President, Prof. D. G. Brinton, who will afterwards give an address on "The Aims of Anthropology." The Presidents of the sections, and the subjects of some of their addresses, are as follows:—Section of Physics: "The Problem of Aerial Locomotion," W. Le Conte Stevens. Section of Anthropology: F. H. Cushing. Section of Geology and Geography: "The Geological Survey of Virginia, 1835–1841—its History and Influence in the Advancement of Geologic Science," Jed. Hotchkiss. Section of Economic Science and Statistics: "The Providential Function of Government in Relation to Natural Resources," B. E. Fernow. Section of Chemistry: McMurtie. Section of Botany: "The Development of Vegetable Physiology," J. C. Arthur. Section of Mechanical Science and Engineering: William Kent. The affiliated societies meeting in conjunction with the Association are:—The Geological Society of America: Prof. N. S. Shaler, President; Prof. H. L. Fairchild, Secretary. Society for Promotion of Agricultural Science: Prof. William Saunders, President: Prof. William Frear, Secretary. Association of Economic Entomologists. Association of State Weather Service: Major H. H. C. Dunwoody, President; James Berry, Secretary. Society for Promoting Engineering Education: Geo. F. Swain, President; Prof. J. B. Johnson, Secretary. American Chemical Society: Edgar F. Smith, President; Prof. Albert C. Hale, Secretary. American Forestry Association: Hon. J. Sterling Morton, President; F. H. Newell, Secretary. Applications relating to membership and papers should be sent to Prof. F. W. Putnam, Permanent Secretary, Salem, Mass. For all matters relating to local arrangements, hotels, railway rates and certificates, Mr. W. A. Webster, Local Secretary, A. A. A. S., Springfield, Mass., should be addressed.

Mr. R. F. Stupart has succeeded the late Mr. C. Carpmael, as Director of the Meteorological Service of Canada.

The Grocers' Company have renewed the research scholarship held by Mr. Leonard Hill, and have elected Dr. J. Haldane and Prof. Waymouth Reid to the places vacated by Dr. Vaughan Harley and Dr. E. Stirling. The scholarships are each of the value of £250 a year.

At the annual meeting of the London Library, held on Friday last, Mr. Herbert Spencer was elected a vice-president, and Prof. Huxley was elected a member of the committee. A scheme for the reconstruction and extension of the premises, at an estimated cost of £17,000, was discussed and adopted, and it was decided to commence the work when a sum of £5000 has been obtained by means of donations.

The Organising Committee of the International Congress of Applied Chemistry, to be held in Paris next year, met a few days ago to make preliminary arrangements. The Congress will be divided into ten sections, referring respectively to sugar refineries, distilleries and brewing industries, agricultural industries, agricultural chemistry, alimentation and public hygiene, chemical industries, chemical apparatus, metallurgical chemistry, photographic chemistry, and electro-chemistry.

The fifth annual conference of representatives of authorities under the Sea Fisheries Act was held on Friday last, under the presidency of Sir Courtenay Boyle. In the course of a few remarks upon the establishment of hatcheries for sea-fish by committees, or out of Imperial funds, Mr. Bryce pointed out that a great deal had been done by marine laboratories and stations for observation, to determine more fully the habits of the fish, and remarked that only by means of hatcheries, and by prohibiting the taking of undersized fish, was it possible to recreate the diminishing supply of our soles and other flat fish.

We notice with regret that Dr. Valentine Ball, C.B., F.R.S., Director of the National Museum, Dublin, died on Saturday, after a short illness. Dr. Ball was for seventeen years connected with the Geological Survey of India. On the resignation of the chair of Geology in the University of Dublin by Dr. Haughton, he was appointed to it, and twelve years ago he accepted the position which he held at the time of his death. He was the author of several valuable treatises, and while Director of the National Museum, he greatly added to the value of the collections.

Several exhibitions and congresses of scientific interest are noted in the *Board of Trade Journal* as having been lately projected. In connection with the thirteenth International Exhibition to be held at Bordeaux in September next, the Société Philomathique of the town will organise a congress of technical, industrial, and commercial instruction similar to that held in 1886, at which the English Government was officially represented. An international exhibition of articles of food, clothing, hygienic appliances, sport, and inventions of all kinds will be held at the "Parkhaus," Bremen, in the course of this year. It will be open from September 14 to October 6. An international exhibition will also be held in Montreal, Canada, next year. The exhibition will open in May, and close in October. It will be held on the site of the present exhibition grounds and on adjoining land of the Mount Royal Park, embracing altogether about 120 acres. The buildings will be twenty-seven in number, and will be devoted to fine arts, manufactures, and liberal arts, electricity, machinery, fisheries, forestry, horticulture, agriculture, &c. Finally, according to latest advices from Denver, the plans for the holding of a mining and industrial exhibition in that city, in the fall of next year, are being advanced with vigour and success.

The New York State Bridge Commission have approved the plan of Engineer Charles MacDonald for a steel suspension bridge from New Jersey to New York City. The bridge will be 5600 feet long, with a length of 3110 feet between piers; 125 feet wide, with room for six railroad tracks; and 150 feet above mean tide-water. The piers will be 557 feet high, supported by 125 feet of solid masonry. The cost is guaranteed not to exceed 25,000,000 dollars. The bridge will be much the largest suspension bridge ever attempted.

One of the most remarkable features of earthquake-pulsations is their great duration. The originating earthquake may last but a few seconds or minutes, while the ground at a distance may rock gently through a very small angle for several or many hours. Dr. E. Oddone, of the geodynamic observatory at Pavia, has recently contributed an interesting paper on this subject (*Rend. della R. Acc dei Lincei*, iv., 1895, pp. 425-430). Making use of the records of distant earthquakes during the years 1893-94 by delicate seismometrographs at Rocca di Papa, Rome and Siena, he arrives at the important conclusion that the duration of the pulsations increases with the distance from the epicentre.

Some singular curves showing the distribution of daily wind velocities in the United States, are published by Mr. F. Waldo in the current number of the *American Journal of Science*. The stations chosen range from the Atlantic to the Pacific and Mexican coasts, and include Block Island, New York, Cleveland, San Francisco, San Diego, North Platte, Fort Apache, Salt Lake City, and Roseburgh, among others. The months of January and July are selected as typical months for average daily variation. The daily variations are always greater in summer than in winter, except for Fort Apache, on the great plateau, where the excursions are about equal. At this place the velocities vary from 9·2 to 3·3 miles per hour in January, and from 10·1 to 2·9 miles per hour in July, the maximum in each case taking place at about 4 p.m., and the minimum at 8 a.m. The greatest variation of all is shown by the San Francisco curve for July. About 4 p.m. the wind blows with a speed of some 18 miles per hour, which falls to 7 miles per hour in the forenoon. Tatoosh Island shows a minimum at 2 p.m. in January, but its variations in July are similar to those at Block Island in the Atlantic, which shows the same sequence as the continental stations referred to, but with smaller amplitudes.

Two observations recorded by Mr. W. C. J. Butterfield, in the *Zoologist*, give support to the view that individual female Cuckoos only introduce their eggs into the nests of one particular species of birds, and not indiscriminately into those of any of the birds usually selected as foster-parents. Mr. Butterfield took a Cuckoo's egg from a Wren's nest in the early part of May, and three weeks later found another Wren's nest within a few yards of the former one, also containing a Cuckoo's egg. The two eggs were exactly alike, both as to size, and as to the manner in which the colouring matters and markings were disposed. It is therefore most probable that the eggs were laid by the same bird; for it is well known that a strong family likeness exists between the eggs laid by the same individual, although the eggs of different individuals of the same species may vary considerably. The observation thus affords another instance of a Cuckoo placing its egg in the nest of a particular species of bird, although there were numerous nests of Hedge-Sparrows and other dupes of the bird in the vicinity, into which the egg could have been put with much less difficulty.

A STORY to the effect that a new breed of cats had been produced in the cold-storage warehouses of Pittsburg went the rounds of the newspapers some months ago, and was reprinted in most of our scientific contemporaries. It has even found its way into Mr. Lydekker's recent volume on "Cats." A letter received from the Secretary of the Cold Storage Co., and published in the June number of the *American Naturalist*, shows that the story has but a slight foundation in fact. The letter reads as follows:—"While there is some foundation for the newspaper article, it is somewhat exaggerated. Our cold-storage house is separated into rooms of various sizes, varying from 10° to 40° above zero. About a year ago we discovered mice in one of the rooms of the cold-storage house. We removed one of the cats from the general warehouse to the room referred to in the cold-storage house. While there, she had a litter of several kittens; four of these were transferred into one of the general warehouses, leaving three in the cold-storage house. After the kittens were old enough to take care of themselves, we put the old cat back into the house we had taken her from. The change of climate or temperature seemed to affect her almost immediately. She got very weak and languid. We placed her again in the cold-storage room, when she immediately revived. While the feelers of the cats in the cold-storage room are of the usual length, the fur is thick and the cats are larger, stronger, and healthier than the cats in any of the other warehouses." Thus, it is pointed out, the only result of the change of environment was the usual one which ensues on the advent of winter in extra-tropical latitudes generally.

HERR H. SCHINZ reprints from Engler's *Botanisches Jahrbuch*, vol. xxi., a synopsis of the African Amaranthaceæ, in which a number of new species are described.

THE most recent part published (No. 7) of Dr. George King's "Materials for a Flora of the Malayan Peninsula," published in the *Journal* of the Asiatic Society of Bengal, is occupied by the orders *Meliaceæ*, *Olacineæ*, and *Ilicineæ*. A large number of new species are described, and a new genus, *Bracea*, belonging to the Olacineæ.

IN an article reprinted from the *Ann. de la Société belge de Microscopie*, M. E. Marchal discusses the microbiological processes which take part in the ripening of soft cheeses, especially those known as "fromage de Herve" and "fromage Casette." While a large number of microbes appear to assist in the process, he states that the essential part is played by the fungus known as *Oospora lactis*, Sacc.

IN a previous note (vol. li. p. 540), we have given a brief account of the Vicentini microseismograph erected in the University of Siena. A full description of the instrument, illustrated with three figures, has now been published by the inventor (*Bull. Soc. Veneto-Trentina di Sci. Nat.* vi., 1895), and well deserves the attention of seismologists.

WE are glad to observe that the South London Entomological and Natural History Society reports a prosperous condition, in the volume of *Proceedings* for the year 1894. The Society dates back to 1872, and has been a centre of scientific energies ever since its foundation.

THE papers read at the fifth annual meeting of the Museums Association, held at Dublin a year ago, have just been published in a report of the proceedings at the meeting. The report, which is edited by Mr. E. Howarth and Mr. H. M. Platnauer, should be in the hands of all curators of museums.

THE first number of a bimonthly journal for sanitary engineers will be published at Brussels on August 1, under the title *La Technologie Sanitaire.* It will be under the direction of an editorial committee, the secretary of which is M. Victor J. Van Lint, 115 rue Joseph II., Bruxelles. The journal will deal with all questions relating to public health.

A FULL abstract of a paper on "The Psychologic Development of Medicine," read by Dr. J. H. McCormick before the Johns Hopkins Hospital Historical Club, on April 8, appears in the *Johns Hopkins Hospital Bulletin*, No. 49. The paper follows almost exactly the same lines as Mr. Herbert Spencer's paper in the current number of the *Contemporary Review.*

THE latest addition to the Encyclopédic Scientifique des Aide-Mémoire is "Transmissions par Cables Métalliques," by M. M. H. Léauté and A. Bérard. The transmission of power by metallic cables has given rise to important mathematical developments which are considered in this Aide-Mémoire. The authors confine themselves to the theoretical points which ought to be known to every engineer concerned with cable transmission.

TO the series of Economic Classics in course of publication by Messrs. Macmillan, has just been added Thomas Mun's important treatise, "England's Treasure by Forraign Trade," written about 1630, and printed for the first time in 1664. The treatise marks an important period in the history of economic thought, and its author is regarded by political economists as the founder of the mercantile system. In the present reprint of the first edition of the book, the title-page is reproduced in facsimile, and the original spelling and punctuation are followed throughout.

THE third part of "Phycological Memoirs," edited by Mr. George Murray, has just been published by Messrs. Dulau and Co. The memoirs are devoted to researches made in the Botanical Department of the British Museum (Natural History), and the present part contains papers on "A New Part of *Pachytheca*," "Calcareous Pebbles formed by Algæ," "The Sori of *Macrocystis* and *Postelsia*," and "A Comparison of the Arctic and Antarctic Marine Floras." Four very fine lithographed plates illustrate the papers.

THE colours exhibited by the artificial spectrum-top, described and discussed in these columns some months ago, are shown much more distinctly, and in greater variety, by a "Betts's Chromoscope," sent to us by Messrs. George Philip and Son. The instrument consists of an ingenious whirling table, by means of which heart-shaped pieces of cardboard, having arcs of different thicknesses variously disposed upon them, are put in rotation. A moderate speed of rotation produces a very definite impression of coloured rings, and when some of the more complicated designs are used, secondary tints are clearly seen.

MESSRS. J. AND A. CHURCHILL have published an eighth edition of the well-known "Bloxam's Chemistry, Inorganic and Organic," rewritten and revised by Prof. J. M. Thomson and Mr. A. G. Bloxam. Several new woodcuts have been added, and some obsolete ones have been omitted. Considerable changes have been made in the arrangement of the subject-matter, and a large portion of the book has been rewritten, while the whole of it has been well revised. The changes all appear to have been in the direction of improvement; hence the book will hold its place as a good text-book and a handy work of reference.

WE have received from Dr. L. Palazzo an account of a meteorological station recently attached to the laboratories of the Public Health Department in Rome. The authorities, recognising the important connection between various diseases and atmospheric conditions, have provided the station with a full set of instruments, and intend to instruct students belonging to the school annexed to the laboratories in their use, and to include, among other studies, a short course of meteorology as applied to hygiene. The results of the observations will be regularly published in a special bulletin, with a view to determining more particularly the medico-climatology of that city.

Miss E. A. Ormerod has sent us a leaflet referring to the Forest Fly (*Hippobosca equina*, Linn.), a well-known trouble in the New Forest of Hampshire and its neighbourhood. This fly is to be found on various kinds of animals, as horses, donkeys, cattle, dogs, and cats, to all of which its presence in the hair is a severe annoyance. According to general belief, the fly feeds by blood-sucking; it is also said to find nourishment in the perspiration given off by cattle, but further investigation as to how far this occurs is required. The method adopted to prevent the attacks is to wipe the horses over with a cloth moistened with paraffin, or with some dilute sanitary solution.

We have received a copy of Mr. W. E. Plummer's Report of the Observations made, under his direction, at the Liverpool Observatory, Birkenhead, during 1894. From observations of twenty-two stars, the latitude of the Observatory, for the mean epoch 1894·7, was found to be 54° 24′ 4″·8. A new longitude determination has also been made; exchange of signals with Greenwich Observatory on thirteen nights gave the value 12m. 17·33s. West of Greenwich. The long series of photograph records accumulated at the Observatory, has been used by Mr. Plummer for the derivation of the diurnal inequality of barometric pressure. The results of his investigation are stated in an appendix to the Report, and are clearly exhibited by means of curves representing the diurnal changes of the barometer in each month, and also for the year.

One after another, scientific societies are beginning to organise their literature. Quite recently, under the title "Bibliotheca Geographica," the first volume of a geographical bibliography has been published by the Berlin Gesellschaft für Erdkunde. The volume contains the titles of all the geographical publications during 1891 and 1892, classified into subjects, and each section arranged alphabetically according to the author's names. In general geography there are different classes for text-books, historical geography, mathematical and physical geography, biological geography, and anthropological geography (which covers colonisation and the distribution of disease). The classification adopted for purely geographical papers is very elaborate, and the work done in any region during the years covered by the bibliography can be very easily found. It is proposed to issue annual bibliographies similar to the present volume. The editor of the series is Herr Otto Baschin, and the first volume has been prepared with the assistance of Dr. Ernst Wagner.

The Belgian Society of Geology, Palæontology and Hydrology, aided by Government and other subsidies, has published the first part of an elaborate rainfall investigation of that country, prepared by A. Lancaster, of the Royal Observatory of Brussels. The author is well known to men of science by various valuable publications, and it was entirely due to his efforts that the rainfall service in its present complete form was established in the year 1882. The complete publication will consist of two or three volumes, the first of which contains 224 octavo pages, accompanied by a map drawn by the Military Cartographical Institute, to the 400,000th of the true scale. The number of rainfall stations dealt with is 282, and the monthly sums and means are given for the whole period, together with a series of tables showing the geographical distribution according to catchment basins, and tinted charts showing various annual rainfall zones. The second part will contain various supplementary tables, such as the distribution of rainfall according to seasons, variability of rainfall, &c.; the expense of this part is to be defrayed from the proceeds of the sale of the first part, which is issued at cost price.

From the point of view of stereochemistry, the supposed impossibility of preparing optically active halogen compounds from the corresponding active hydroxy-acids has been a serious defect in the strong array of evidence which has compelled the acceptance of van't Hoff's hypothesis of the asymmetric carbon atom. This defect has at last been remedied by P. Walden, who describes a series of active halogen substitution products in the current number of the *Berichte*. Inquiring whether the inactivity of the halogen derivatives prepared by replacement of the hydroxyl group in active compounds by bromine or by chlorine, were due to an inherent quality of the halogen atom, or rather due to the racemisation of the compounds under the conditions hitherto employed in their production, the author undertook the task of examining the methods used in preparing these compounds. Working on the active hydroxy-acids: malic, tartaric, sarcolactic, and mandelic acids, the substitution of chlorine and bromine for hydroxyl was accomplished by means of phosphorus pentachloride and pentabromide respectively Under the conditions detailed by the author, this substitution was carried out without the racemisation which appears hitherto to have always occurred when these halogen derivatives have been prepared. He has shown that (1) dextro-rotatory chlor- or brom-succinic acid may be prepared from the ordinary lævo-rotatory malic acid; (2) lævo-rotatory tartaric acid yields lævo-rotatory derivatives of its esters, containing a halogen atom in place of a hydroxyl group, which retain the optical activity due to the presence of the asymmetric carbon atom; (3) similarly, dextro-rotatory derivatives of α-chloropropionic acid and α-bromopropionic acid can be obtained from the lævo-rotatory sarcolactic acid; and (4) lævo-rotatory mandelic acid (from amygdalin) yields dextro-rotatory phenylchloracetic acid and phenylbromacetic acid. These active compounds have hitherto only been prepared in the racemic form. Their observed inactivity when so prepared was not due to any accidental limitation of the generality of van't Hoff's theory, but only to the racemisation they had undergone during the process of preparation. It is probably quite generally possible to substitute halogen atoms for hydroxyl groups in combination with active asymmetric carbon atoms without destruction of their optical activity. The activity of the compound depends only on the fact of four different atoms or atomic groups being connected with one and the same carbon atom, while the amount and direction of the rotation produced is unquestionably related to the specific nature of these atoms and groups.

The additions to the Zoological Society's Gardens during the past week include two Macaque Monkeys (*Macacus cynomolgus*, ♀ ♀) from India, presented respectively by Mr. Charles Roberts and Miss Wieldt; a Leopard (*Felis pardus*, ♀) from India, presented by Mr. Edward Langworthy; a Common Otter (*Lutra vulgaris*, ♂), British, presented by Mr. M. P. Clarke; a Northern Mocking Bird (*Mimus polyglottus*) from North America, presented by Mr. Henry J. Fulljames; a Yellow-throated Sparrow (*Gymnorhinus flavicollis*), a Double-banded Pigeon (*Treron bicincta*), two Chinese Quails (*Coturnix chinensis*), two White-breasted Gallinules (*Gallinula phœnicura*) from India, presented by Mr. Frank Finn; two Weka Rails (*Ocydromus australis*) from New Zealand, presented by Mr. Reginald Moorhouse; two Southern River Hogs (*Potomachœrus africanus*, ♂ ♀) from East Africa, presented by the late Mr. B. Ward; a European Pond Tortoise (*Emys europæa*), European, presented by Miss Laura Bedford; a Sharp-nosed Crocodile (*Crocodilus acutus*) from Jamaica, presented by Lady Blake; a Black-spotted Teguexin (*Tupinambis nigro-punctatus*) from South America, deposited; a Ring-tailed Phalanger (*Pseudo-*

chirus peregrinus) from Australia, two Nicobar Pigeons (*Calœnas nicobarica*) from the Indian Archipelago, purchased; a Reticulated Python (*Python reticulata*) from Malacca, received in exchange; a Thar (*Capra jemlaica*, ♀), a Red Deer (*Cervus elaphus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

Occultation of Regulus.—On June 26 there will be an occultation of Regulus, magnitude 1·5. The disappearance will take place at 8.4 p.m., while the sun is still above the horizon, and the star will reappear at 8.56—that is, about 37 minutes after sunset at Greenwich. The point of disappearance will be at an angle of 147° from the north point towards the east, and of reappearance at 275° reckoned in the same direction. The age of the moon will be a little less than 4 days.

The Recurrence of Eclipses.—A new period of the recurrence of eclipses, which promises to be of great use in the discussion of ancient eclipses, has been investigated by Prof. J. M. Stockwell. (*Astronomical Journal*, No. 346.) He points out that 372 tropical years are very nearly equal to 4601 lunations, and also very nearly equal to twenty revolutions of the moon's node; thus:

372 tropical years = 135870·10348 days.
4601 lunations = 135870·23425 ,,
20 revolutions of node = 135870·700 ,,

During this period, the change of mean longitude of the sun and moon at the time of new moon is −5°·057, of the longitude of the moon's perigee +11°·464, and of the longitude of the ascending node +0°·021. The precession of the equinoxes during 4601 lunations amounts to 5°·1368, so that the mean longitude of the sun and moon when referred to the movable equinox only changes by 0°·0797 in a period of 372 years. From this it follows that if an eclipse happened on a given day of the tropical year, there would be another eclipse on the same day of the tropical year 372 years afterwards.

As an example of the application of this new cycle, Prof. Stockwell gives particulars of an inquiry into an eclipse of the sun which is said to have been observed in China on the day of the autumnal equinox during the twenty-second century B.C. According to Oppolzer, an eclipse occurred at the autumnal equinox in the year B.C. 1039, October 3, and going back three periods of 372 years, the year 2155 B.C. is deduced; other eclipses about this time are found by adding multiples of nineteen years to that date. The discussion of the conditions shows that the eclipse which satisfies the tradition occurred on October 10, 2136 B.C.; this would be visible as a partial eclipse over nearly the whole of China. According to a well-known story, the astronomers Ho and Hi were put to death for having failed to predict this eclipse.

Variability of Nebulæ.—One of the best authenticated cases of a variable nebula is that discovered by Hind in 1852 in the constellation Taurus. The nebula was then easily seen in ordinary telescopes, but D'Arrest was quite unable to see it in October 1861, though it was detected shortly after as an exceedingly faint object in the Pulkowa refractor, and in the following year was seen a little brighter with the same telescope. In 1868, however, the nebula was invisible to Struve, but another nebula was discovered 4′ preceding. Struve's nebula was subsequently observed by D'Arrest, who testified to its absence in previous observations of the neighbourhood; it was seen also by Tempel in November 1877, but was not visible to him a month later. The interest attaching to this region was increased when, in 1890, Mr. Burnham found that τ Tauri was involved in nebulosity; this was confirmed by Prof. Barnard, who also observed that Hind's nebula was only just visible with the Lick telescope, while Struve's nebula was not perceptible. In a paper recently communicated to the Royal Astronomical Society, Prof. Barnard states that on February 25 of the present year he found Hind's nebula to be an easy object, while Struve's nebula was absent, and the nebulosity round τ Tauri had practically faded to invisibility. Further observations on March 24 showed that Hind's nebula was again scarcely visible, while τ Tauri was distinctly nebulous, and a faint nebula was suspected in the position assigned to Struve's nebula (*Observatory*, June).

It thus appears that there are really three variable nebulæ in this region, and the observations rather suggest that there is a connection between them. In 1890, Prof. Keeler found that the nebulosity round τ Tauri was probably of the bright-line type, but nothing seems to be at present known as to the spectra of Hind's and Struve's nebulæ. On the meteoritic hypothesis, changes in the brightness of nebulæ are due to the interpenetration of nebulous streams and sheets.

The Zi-ka-wei Observatory.—The Zi-ka-wei (or Sicawei) Observatory, near Shanghai, was founded in 1873 by the French Roman Catholic Mission of Kiang-nan, and provided with the instruments necessary for the study of meteorology and terrestrial magnetism. Since that time, excellent service to commerce and to science has been rendered by the Observatory, by the daily publication of weather bulletins, and the issue of a number of important memoirs. Up to the present, however, astronomy has received little attention at Zi-ka-wei. Twelve years ago, the Municipal Council of the French Settlement furnished the Observatory with a small transit instrument for time determinations in connection with the time-ball service then established, but that instrument represents the whole astronomical outfit. Recognising this deficiency, Father Chevalier, the Director of the Observatory, has made an appeal for funds to purchase a good equatorial telescope. The English Settlement at Shanghai has voted a sum of £400 towards the cost of the instrument, and the French Settlement has granted a like amount. The shipping companies at Shanghai have also promised a sum of about £400, so that £1200 may be taken to be already available. But Father Chevalier wishes to have an instrument with an aperture of about twenty inches, and for this the money already subscribed is insufficient. He has therefore appealed to friends of science in France, America, and England for a sum of about £1000 more. If this is contributed, he hopes to have erected a great equatorial, and to accomplish valuable work with it.

THE ROYAL SOCIETY CONVERSAZIONE.

The rooms of the Royal Society at Burlington House were filled last Wednesday evening, when the annual conversazione to which ladies are admitted took place. Some of the exhibits were shown at the conversazione on May 1, and have already been described in these columns. Following our usual custom, we only give descriptions of new exhibits.

Perhaps the most striking feature of the evening was the telephonic communication with Edinburgh, Glasgow, Belfast, and Dublin, practically shown by the Postmaster-General. The line used is the first link of the great Trunk Telephone System erected by the Post Office, which will eventually place the chief towns in the British Isles in direct communication with each other. The wires to Ireland extend through Leeds and Carlisle to Portpatrick, thence by cable across the North Channel to Donaghadee, and thence to Belfast and Dublin, the distance by this route from London to Dublin being 467 miles. The lines are so carefully laid that it was easy to converse with persons at the places connected by them, without being disturbed by the foreign sounds usually associated with telephonic communications.

An electograph for indelible linen marking was shown by Messrs. Nalder Bros. and Co. The instrument is used as follows: the fabric is damped and a current is passed for about two seconds from a silver die, carrying silver into the fabric wherever the die touches. The current is then reversed for three seconds, which reduces the silver in the fabric; the final result being the same as with ordinary marking-ink, viz. that metallic silver is deposited in the tissue. Plain water can be used, but a salt solution is preferable, as the result is much more quickly obtained.

Models illustrating Lewis and Hunter's patent coal shipping system, as in use at the Bute Docks, Cardiff, were exhibited by the Bute Docks Company. With this system the coal is shipped in very much better condition than with the old systems, and owing to the construction of the carrying-boxes, with a cone valve or bottom, which is only released to let the load out when it is lowered down into the hold of the vessel, within some 18 inches of the flooring of the ship or the cargo, as the case may be, the breakage is greatly reduced. Each crane is capable of loading 300 tons per hour.

Prof. C. V. Boys illustrated the projection of ripples, and showed a logarithmic chart of wave and ripple velocities and frequencies. Ripples produced by tuning-forks are so small, and travel so quickly, as to be invisible unless illuminated either instantaneously or intermittently at the proper rate. They are then visible, and the relations of velocity and frequency can be